

SPACE CUTTER



PLAYGUIDE FOR ATARI ST AND COMMODORE AMIGA

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North America:
Rainbird Software
P.O. Box 2227
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California 94026

Europe:
Telecomsoft
First Floor
74 New Oxford Street
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LOADING INSTRUCTIONS FOR ATARI ST AND COMMODORE AMIGA

SYSTEM REQUIREMENTS

Atari ST or Commodore Amiga with minimum of 512K of RAM and a 3.5 inch disk drive.

Atari ST needs TOS in ROM and a colour monitor or T.V.

Commodore Amiga needs Kickstart version 1.2 or above.

LOADING THE PROGRAM

Atari ST

1. Switch off your computer.
 2. Insert the disk into the disk drive.
 3. Switch on your computer.
- The game will automatically load and run.

Commodore Amiga

1. Users with Kickstart on disk should first boot Kickstart version 1.2. or later.
 2. At the workbench prompt, insert the disk
- The game will then load and run.

Please note that the presence of any RAM expansion or non-standard hardware may inhibit the correct operation of the game.



THE GAME - A LIGHTNING GUIDE

IDENTIFICATION

Before you begin a fresh game, you are asked to enter your name. This should be no more than twelve letters and once you have typed it in you must press RETURN.

If you choose to enter nothing, you will be referred to as 'ANONYMOUS'.

You only have to enter your name once. On the second game, you can just press RETURN during the identification procedure to indicate no change of name.

THE CONTROLS DURING ACTION

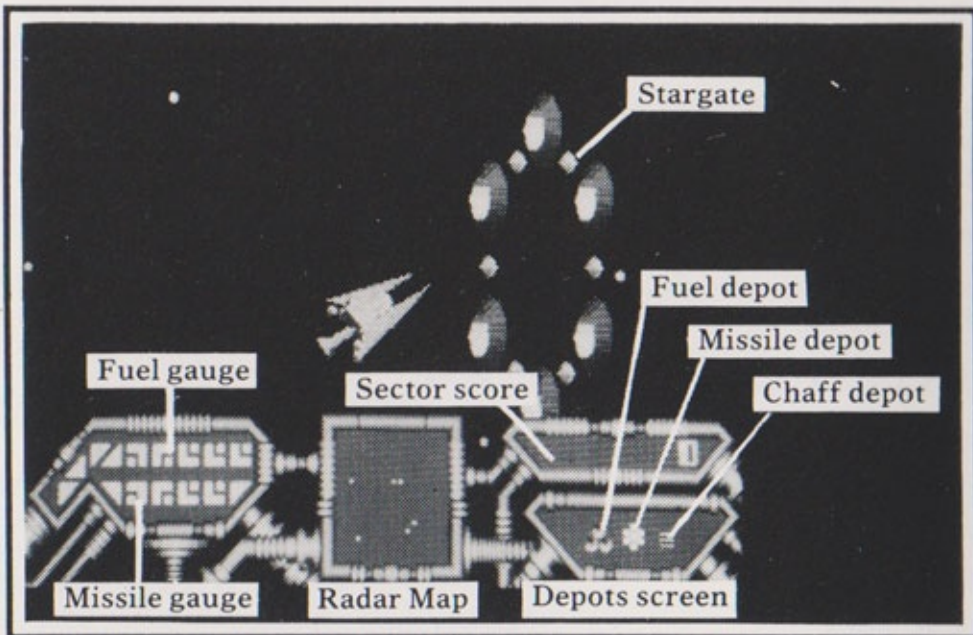
MOUSE LEFT BUTTON	-fire missile
MOUSE RIGHT BUTTON	-release chaff
MOUSE FORWARD	-increase speed
MOUSE BACK	-decrease speed
MOUSE LEFT	-continuous left turn
MOUSE RIGHT	-continuous right turn
MOUSE CENTERED	-no turn
ESCAPE	-abandon ship
CONTROL	-control panel up/down
DELETE	-music off/on
SHIFT	-pause/continue game

THE DISPLAY CONTROLS AFTER GATESPACE TRANSIT

V	-visual scan of ships you are about to encounter in next sector (press once for each ship type)
P	-perfect solids you still need to get
RETURN	-return to sector map display
ENTER or LEFT MOUSE BUTTON	-enter the next eigenspace

Note that these controls only become operational after gatespace transit is complete; they do not operate until the sector map turns red.

THE CONTROL PANEL



Fly through the centre of the stargates to get to the next level.

The fuel and missile gauges darken from left to right as the level drops. The depots screen displays a symbol for each depot to be found in the sector. The radar map displays strategic information:-

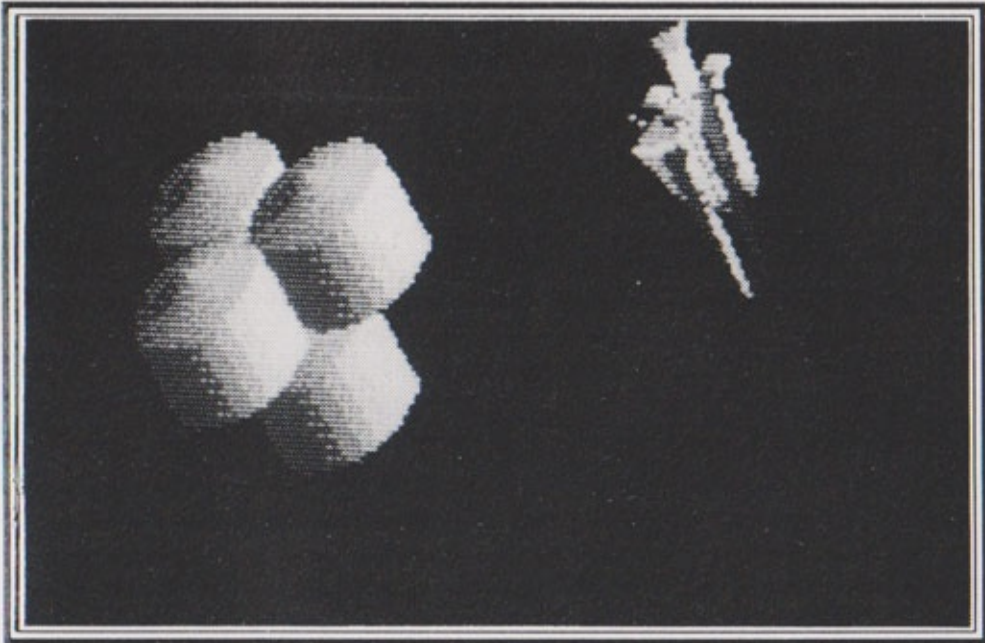
Your ship	- yellow dot
Depots	- blue dots
Stargates	- white dots

Enemy ships cannot be plotted by your radar, which is primarily a navigational aid. The control panel can be moved up or down by pressing the control key. It is best to use it only when you really need it.

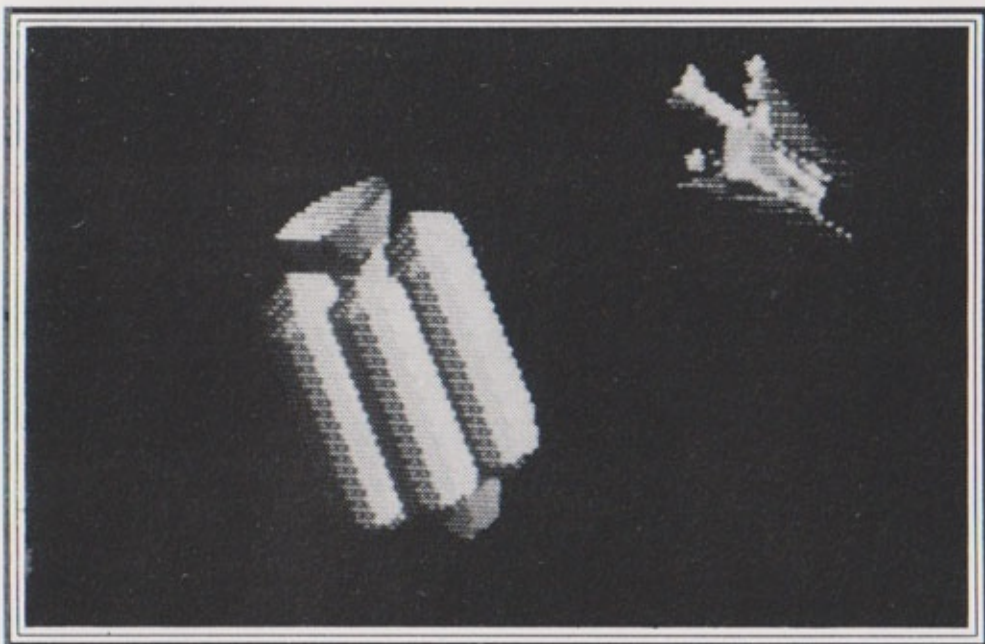


THE DEPOTS

FUEL DEPOT - fly close to re-fuel



MISSILE DEPOT - fly close to re-arm

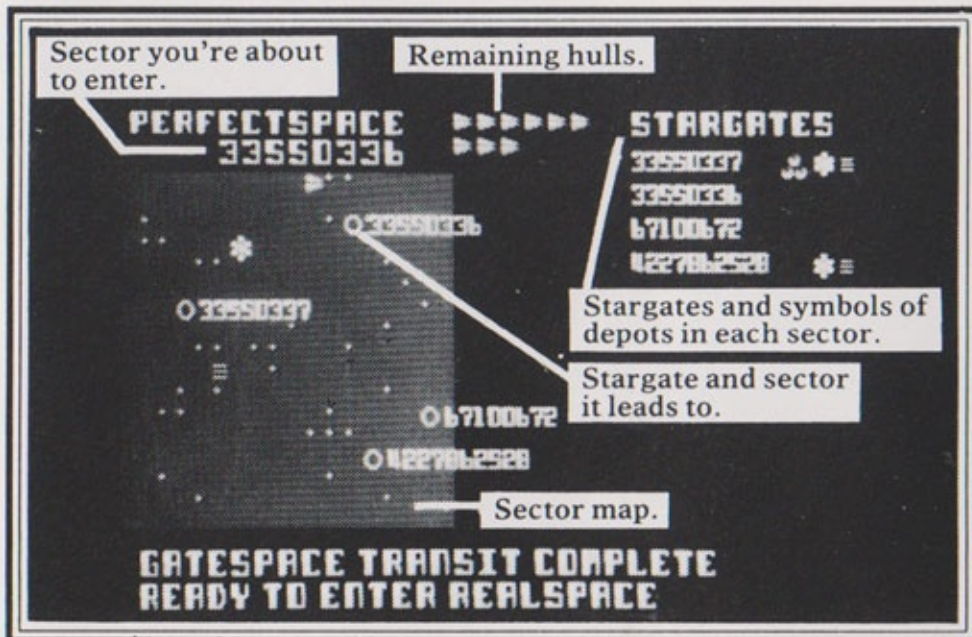




CHAFF DEPOT - fly close to re-chaff



THE SECTOR MAP DISPLAY





MAP SYMBOLS

FUEL DEPOT 

MISSILE DEPOT 

YOUR SHIP 

CHAFF DEPOT 

After a short journey across Gatespace, your ship arrives at the threshold of the next sector. When this happens, the map turns red and you can enter the next sector but until then all your ship controls are dead.

You should study the sector map carefully during your journey and try to remember the location of whichever Stargate is next on your route. Knowing where everything is can be vitally important to the success of your mission!.

PLAYING THE GAME

INTRODUCTION

The game takes place within the 'Whirligig' which is a vast network of mini-universes or 'eigenspaces' which are linked together by stargates. There are over 4 billion eigenspaces in the entire network. Each stargate is a form of black hole through which only one-way travel is possible. Most eigenspaces contain a number of stargates leading to a variety of other spaces. There is an overall pattern to the network of eigenspaces and stargates but it is not trivial. The Technical Appendix gives a full explanation.

Five out of the 4 billion spaces in the 'Whirligig' have special properties that make each of them a 'perfect' eigenspace or, for short, a 'perfectspace'. Each of the 5 perfectspaces contains one of the 5 perfect solids, sometimes known as the Platonic solids, and each perfect solid has a ship close-by, guarding it.

These 5 solids are the key to ultimate success in the game. Each of these solids has an attractor field surrounding it. By manoeuvring your ship into the attractor field, you can drag the solid along behind you providing you don't twist and turn too sharply. Drag it through a stargate and you've captured it. If you capture all 5 perfect solids, their combined power opens a timegate back to Earth in it's golden age, 1988 AD; your mission score shoots up to infinity and you've won the game!

The perfect solids and their eigenspaces are:-

PERFECTSPACE	6	TETRAHEDRON	4 FACES
PERFECTSPACE	28	CUBE	6 FACES
PERFECTSPACE	496	OCTAHEDRON	8 FACES
PERFECTSPACE	8128	ICOSAHEDRON	20 FACES
PERFECTSPACE	33550336	DODECAHEDRON	12 FACES



Don't be too dismayed by the prospect of having to reach perfectspace 33550336 - it doesn't mean you have to get through 33 million sectors. The way the 'Whirligig' stargate network is organized allows you to make giant leaps forward from some sectors (and giant leaps backwards from others!). We have discovered a route that takes just 36 sectors to get from space 0 to space 33550336 - and there may be even quicker routes. Two of the routes we've discovered are to be found in the Technical Appendix, just so you won't die of old age before you find your way to the 5th perfectspace!

Pilots who don't make it to the ultimate objective are given a mission score. The maximum possible mission score (below the winning score of infinity) is four billion, two hundred and ninety-six million, nine hundred and sixty-seven thousand, two hundred and ninety-five. At this point, the scoring stops, no matter how many more enemy ships you manage to obliterate.

YOUR SHIP

Your ship is a Meson Class Fighter capable of severe rates of turn and with a dangerously high maximum speed. It is equipped with both missiles and chaff pods. The other important thing it carries is fuel!

Flying at high speed most of the time, you won't want to keep looking at a mass of gauges - you'll want to keep both eyes firmly on the action. In the game, this is easy because the shape of the ship, quite literally, shows you how ship-shape it is!

As your fuel runs out, the rocket motor at the rear of your ship gradually slides into the main hull. As you use up missiles, the cockpit inches forward. Finally, all 4 of your chaff pods are attached to the rear edge of the ship's wings and disappear one by one as you loose them off.

Your ship's cockpit also behaves as an escape pod. You can abandon ship at any stage of the game by pressing the ESCAPE key. When this happens, your ship self-destructs. Your cockpit leaves realspace briefly and attaches itself to one of your stock of spare hulls. You then re-enter the same sector but with a ship equipped with its full complement of missiles, chaff and fuel. The same also happens if your ship is destroyed by collision or by missiles.

You start the game with 12 hulls. When you have no hulls left, your mission is terminated.



FUEL

Fuel is only used up when you slow down, speed up or turn. Flying in a straight line at a constant speed uses no fuel at all. So, if you have nerves of steel and can fly on a steady course, you'll get a lot more flying time.

Likewise, if you run out of fuel, your ship doesn't just stop dead in it's tracks. Instead, it carries on flying in a straight line in the direction it was heading. You won't be able to steer it, speed it up or slow it down, although you will still be able to fire off missiles and chaff.

Usually you will end up crashing into something if you run out of fuel but you should be able to score a few more points before you do so. If you're lucky, you might slip down a stargate (but you'll still have no fuel in the next sector). If you're very lucky, you might pass a Fuel Depot and get extra fuel.

Occasionally, however, you can find yourself endlessly orbiting a sector. When this happens, there is only one thing to do - abandon ship by pressing the ESCAPE key. After a short delay, you will re-enter the sector with a brand new, fully-fuelled ship.

MISSILES (Left mouse button)

The missiles carried by your ship are all target-seeking missiles which will home in on the nearest object within a certain range. This range is slightly greater than the width of the screen.

So why don't you just fly along continuously pressing the missile button, blasting everything in sight? Unfortunately, your target-seeking missiles are not very intelligent. They always go for a target and if there is nothing else in range, that target will be your own ship!

In general, you will find the missiles very effective but they do have their limitations. On occasions, you'll find that their flight path to their target takes them right through the middle of your ship. On other occasions, you'll find that their rate of turn forces them into an orbit around their erstwhile target. And, of course, if you turn into their flight path, you're just asking for trouble.

Although it's quite possible and often very easy to hit targets behind your ship, it's much safer to line your ship up on a target - your missiles will get there quicker too. You can have up to 3 missiles in flight at any one time.



CHAFF PODS (Right mouse button)

Your chaff pods are really defensive devices. Their speed and manoeuvrability are much greater than a missile's and, what's more, their targetting is more sophisticated.

First, they search for any objects within range. Then, they select one of these with the following priorities:-

- | | |
|------------|---|
| Priority 1 | -The nearest missile homing in on your ship |
| Priority 2 | -The nearest enemy homing in on your ship |
| Priority 3 | -The nearest object excluding your ship |

These priorities ensure that chaff tends to home in on the most dangerous object around. If the pod can't find a valid target, then the firing sequence is aborted.

When the chaff pod is released, it homes in on its target with extreme speeds and destroys it. When your ship is in great danger, you'll often be able to get out of trouble by hitting the chaff button.

Of course, it is possible to use your chaff as an offensive weapon, but you only carry 4 chaff pods. It's usually best to save them for moments of dire peril.

FLYING YOUR SHIP

Your ship is controlled by movements of the mouse. Moving the mouse forward will increase your speed. Moving it back will decrease your speed.

Move the mouse to the left for a continuous left turn, move it to the right for a continuous right turn and centre it for straight-line flight.

The mouse has been programmed for a more sensitive left-right response at low speeds and a less sensitive response at high speed. This allows you to make emergency stops and rapid take-offs without veering wildly off-course but also allows very tight turns at low speed.

STARGATES

Stargates are the links between sectors. Each leads to one particular sector and they are all one-way links. You can't go back the way you've come! Eigenspaces 0 and 1 each contain just one stargate but all other sectors contain at least three. There are some eigenspaces with as many as eleven stargates.

When you fly your ship through the centre of a stargate (without colliding of course) your ship and the rest of the immediate universe disappears down a black hole and you enter gatespace.



Whilst your ship is crossing gatespace to the next sector, a map of the next sector appears on your computer screen. After a short while your ship arrives at the threshold of the new eigenspace. Then, when you press ENTER or the left mouse button, your ship pours out of another black hole into the new sector and the action starts again.

Flying through a stargate is the most basic skill necessary in the game. Before that is mastered, you literally get nowhere! It isn't outrageously difficult but it does need some practice to perform the manoeuvre swiftly and smoothly.

You'll find eigenspace 0, the sector in which you start, the best place to practice 'crashing the stargate' - all the enemy ships in this sector are fairly passive and you won't find anything tailing you as you try to line-up on the gate. This makes things considerably easier.

Because of time-space discontinuities, enemy ships that follow you down a stargate do not emerge with you at the other end. So, if you're a good pilot, you can use stargates to escape from enemies homing in on you or tailing you.

THE TIMEGATE EFFECT

Each eigenspace is not just closed in space - it is closed in time as well. It can only ever be entered at one particular moment in its own timeframe.

You will discover this whenever you re-enter the same eigenspace. Each time you go back in, you'll find everything exactly as it was the first time you entered it, no matter what terrible destruction you've managed to cause since then.

In the perfectspaces, this fact has a strange result. One of the peculiar properties of the perfectspaces is that each one contains a stargate that leads back to the very same space. This seems fairly pointless until you remember that every re-entry of a sector takes you back to the same moment in time. These stargates that lead back to the perfectspace they are located in, are, in effect, timegates!

There is one paradox of the timegate effect - the perfect solids (which are capable of existential discontinuity, amongst other things). When you drag one of these down a stargate they do more than just leave that sector - it's as though they never existed there in the first place. Return to the sector and you'll find everything else just as it was but no perfect solid and no ship to guard it.



DEPOTS

From time to time, you will need to refuel, re-arm or re-chaff. To do this you will need to find the appropriate fuel depot, missile depot or chaff depot.

When you make a close fly-past of a depot, it will beam a full load of fuel, missiles or chaff across to your ship. As it does so, the space continuum flickers for a moment - white for fuel, yellow for missiles or blue for chaff.

If you've already taken supplies from the same depot, you may have to wait a minute or two before it's ready to beam you some more.

Not every sector contains a depot but fortunately, they are fairly common, with over 2 billion fuel depots, over 1 billion missile depots and over 800 million chaff depots in the entire 'Whirligig'.

Starting with eigenspace 1, every 2nd sector contains a fuel depot, every 3rd sector contains a missile depot and every 5th sector contains a chaff depot. Consequently, every 6th sector provides both fuel and missiles, every 10th sector provides fuel and chaff, every 15th sector provides missiles and chaff, and every 30th sector provides all three!

THE ENEMY

The enemy, are a mechanical race of intelligent ships which have managed to enslave most of the human race. They infest the whole Galaxy and over 100 billion of them (and we're not exaggerating) are to be found in the 'Whirligig' itself. They will all do their best to terminate your mission.

The ships have a saying which, roughly translated, runs 'All ships are intelligent but some are more intelligent than others'. This is particularly true of those you will find in the 'Whirligig'.

Many enemy ships are passive, possessing no missiles and these simply whirl along fixed paths in their own chosen eigenspaces. The only danger from them is accidental collision.

There are other enemy ships which follow fixed paths but which also have a stock of missiles. Come too close to these and you're likely to get blasted.

Lastly, there are the ships-of-prey, the fighters, the destroyers and the interceptors. These are lethal. They are usually at rest, but when you come



within range of their sensors (which may be at quite a distance), they lock on to your ship and begin to home in on it. Then they will hound you relentlessly, firing off missiles as they go.

Worse still, some of the ships-of-prey are actually invulnerable to missiles or to chaff or to both! All you can do about these is to outmanoeuvre them either to lose them entirely or to cause them to crash into other ships.

LEVELS OF DIFFICULTY

The higher the number of the sector, the more difficult the sector is. However, there aren't 4 billion levels of difficulty. The levels are as follows:-

level 1	-sector	0
level 2	-sectors	1 - 9
level 3	-sectors	10 - 99
level 4	-sectors	100 - 999
level 5	-sectors	1000 - 9999
level 6	-sectors	10000 - 99999
level 7	-sectors	100000 - 999999
level 8	-sectors	1000000 - 9999999
level 9	-sectors	10000000 - 99999999
level 10	-sectors	100000000 - 999999999
level 11	-sectors	1000000000 - 4294967295

Within a level, the sectors vary and some are easier than others but not necessarily in numerical order. Between levels, however, there is a severe difference in difficulty. The higher you go, the more and more ships-of-prey you will find and these get progressively swifter and more manoeuvrable.

THE SCORING SYSTEM

You have two scores, a mission score and a sector score. The sector score is simply the total value of all the enemy ships destroyed whilst you were in the last sector. Generally speaking, ships carry a higher score value the higher the level of sector. A ship worth 10 points on level 1 will be worth 100 points on level 10.

The mission score is the total of all your sector scores but with a special bonus system. When you leave a sector, your sector score is added to your mission score. Then the bonus is added. This bonus depends on which of the perfect solids you have managed to capture:-



TETRAHEDRON	-BONUS-1 x SECTOR SCORE
CUBE	-BONUS-2 x SECTOR SCORE
OCTAHEDRON	-BONUS-3 x SECTOR SCORE
ICOSAHEDRON	-BONUS-4 x SECTOR SCORE
DODECAHEDRON	-BONUS-5 x SECTOR SCORE

If you've captured more than one, the bonus multiplies even further. Let's say you've captured the cube and the octahedron. On their own they would be worth 2 times and 3 times your sector score. Together they are worth 2×3 times your sector score.

So, if you'd captured the last four perfect solids, your bonus would be $2 \times 3 \times 4 \times 5$ times your sector score - 120 times your sector score!

NOTHING IS RANDOM

There are no random numbers in the game. Everything that happens is a predictable consequence of your own actions. Although the enemy ships move according to their own logic, there is nothing random about the way they move; you act and they re-act. Even when they are out of visual range, they are still moving about out there according to their individual patterns of behaviour.

The enemy ships don't just pop-up out of nowhere either. When you enter a sector, there are only so many ships. No new ones will magically appear, so if you are fast and accurate, you can wipe a sector clear of the enemy.

EXPLORING THE 'WHIRLIGIG'

The 'Whirligig' is a vast and intricate network of different eigenspaces which you can explore to your heart's content (if you can get past the enemy ships). Finding the best routes to the perfectspaces is one task an intrepid explorer might set himself - the best route is not just the quickest; it should have plenty of depots on the way and hopefully not too much opposition. Or, you might prefer just exploring for its own sake.

We have doubts, however, that anyone will ever manage to explore the entire 'Whirligig'. To spend a minute in each sector would take you eight thousand one hundred and seventy one years of continuous play!



TECHNICAL APPENDIX

THE EIGENSPACE NETWORK

We haven't really got space to print a map of the entire network but there is a precise mathematical pattern to the network of stargates and eigenspaces, knowledge of which could help you find and plan strategic routes, if you're mathematically inclined. So, here goes with the pattern.

Every sector is identified by a code number, which we'll call N . Every sector N contains stargates linking it to the following sectors:-

- a) Sector $N+1$
- b) Sector S , where S is the sum of all the divisors of N excluding N itself.
- c) Every sector $P \times N$, where P is a prime factor of N . There may be up to 9 such sectors.

All sector numbers and links are calculated to the modulus 2^{32} or, to put it another way, to 32-bit precision. Where the link calculation would result in a sector number greater than 32 bits, the additional bits are ignored - like a car's milometer, the sector numbers clock round through zero again. So, you will find, for example, that the stargate leading from sector 4294967295 to sector $(N+1)$ leads to sector 0.

In the 'Whirligig' system, zero is defined as having no divisors and no prime factors, so sector 0 leads only to sector 1. One, we know, has no divisors excluding itself and nor does it have any prime factors, so likewise sector 1 leads only to sector 2. All other sectors contain at least 3 stargates.

There is a further pattern superimposed on the eigenspace network. This concerns the occurrence of fuel depots, missile depots and chaff depots. Where N is a positive integer, they occur as follows:-

Fuel depots in every sector	$2N+1$
Missile depots in every sector	$3N+1$
Chaff depots in every sector	$5N+1$

It is possible to use this information on the network pattern to work out quick routes to particular sectors. For example, you can prove that any sector P , where P is prime, always has just 3 stargates leading to sector 1, sector $P+1$ and sector $P \times P$. So, by going through a prime sector, you can take a small step forward or a huge leap forward or end up almost back at the start.

You also know that 31 is prime, so you can work out that sector 31 leads to sector 1, sector 32 and sector 961. In addition, 31 is a number of the form $2N+1$.



$3N+1$ and $5N+1$ so it contains a fuel depot, a missile depot and a chaff depot. A little further calculation will reveal that sector 961 does too. Suddenly you've discovered quite a strategic sector.

THE PERFECT EIGENSPACES

In mathematics, a perfect number is a number that is the sum of all its divisors excluding itself. There are only 5 such numbers below 4 billion and the 5 perfect eigenspaces correspond to these 5 numbers.

Since sectors are linked to the sum of their divisors excluding themselves and a perfect number is the sum of all its divisors excluding itself, each perfect eigenspace therefore contains a stargate that leads directly back to the very same eigenspace. This is the peculiar property of perfectspaces mentioned in the section on the timegate effect.

TWO ROUTES TO PERFECTSPACE 33550336

Once you start exploring the higher levels of the 'Whirligig', you'll find it very easy to get completely lost in the labyrinth. It's not too hard getting to the high numbers. What is hard is finding a particular one. We're sure you'll find your own way to the other perfectspaces but we're not so sure about perfectspace 33550336. It's certainly unlikely that you'd ever get there by pure coincidence. So, we now give you two possible routes to perfectspace 33550336. We don't claim they're the quickest or the best routes but they will at least get you there. The first route takes 36 sectors. The second route takes 38 but there are more depots along the way. Depots are indicated by F for fuel, M for missiles and C for chaff.

THE FIRST ROUTE

0 — 1 FMC — 2 — 4 M — 5 F — 6 C — 18 — 54 — 66 C — 78 — 156 C — 157 FM — 158 — 316 MC — 317 F — 318 — 330 — 534 — 546 C — 1638 — 2730 — 5460 — 16380 — 16381 FMC — 16382 — 32764 M — 65528 — 131056 MC — 262112 — 524224 M — 1048448 — 2096896 MC — 4193792 — 8387584 M — 16775168 — 33550336 MC

THE SECOND ROUTE

0 — 1 FMC — 2 — 3 F — 9 F — 10 M — 20 — 40 M — 80 — 106 MC — 212 — 424 M — 848 — 1696 MC — 1706 C — 3412 M — 3413 F — 3414 — 3426 C — 6852 — 13704 — 27408 — 27409 FM — 27410 — 54820 M — 109640 — 219280 M — 219281 FC — 219282 — 219283 FM — 3727811 FC — 3727812 — 3727813 FM — 3727814 — 3727815 F — 11183445 F — 33550335 F — 33550336 MC

